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ABSTRACT

The purpose of this study was to compare preschool children from classes using the Montessori method and Science-A Process Approach (S-APA) in the process skill of observation. The first stage of the study compared the programs with respect to (1) the sequential presentation, (2) the use of materials to provide sensory training, (3) practice acquired through activities, and (4) the role of the teacher. Conclusions were that because S-APA and Montessori seemed to have common elements and because both had taught the process of observation, there was a reasonable justification to compare student competence in observation. The second part of the study compared the competence on observational tasks of three groups of 25 children, ages 5 and 6. The first group received Montessori training for two years in preschool, the second group used S-APA for one year with background of another type of preschool that excluded Montessori, and the third group which served as a control had neither Montessori nor S-APA training in their two-year preschool experience. Students were tested on a set of observational tasks from the text, the Science Process Instrument. Findings showed no significant differences between the Montessori and the S-APA preschool students in regard to competence in observation. Both the Montessori and the S-APA groups scored higher than the control group. (DT)

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A COMPARISON OF PRESCHOOL CHILDREN IN OBSERVATION TASKS FROM TWO PROGRAMS: MONTESSORI AND SCIENCE-A PROCESS APPROACH

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In the past decade there has been a renewed concern for innovative science curriculum in elementary schools concurrent with the development of new techniques in early childhood education. Concern for processes of learning in these two areas led to many changes in science and early childhood education.

Researchers in early childhood education found that the first six years of life are the most important for learning (Shane, 1969). This revelation stimulated the government to promote early childhood programs to develop the learning potential of young children. As these programs, such as Headstart, were being tried out in the 1960's, a renewed interest was directed toward the Montessori method (Lillard, 1972).

Program development for elementary science was another concern of educators in the 1960's. The federal government, again played a part in funding programs to make science more meaningful [illegible]ung children. Science-A Process Approach (S-APA), a science [illegible]structured around science processes, is one of the programs that resulted from the federal funding.

The basic skills of S-APA are learned in kindergarten through grade three, the early childhood years. One of the basic process skills is observation which serves as the focus for this study. Observation is a process skill that seems to be developed both in S-APA and in the Montessori method as a basic learning process. According to the writers of S-APA, one of the major

goals of S-APA was to develop observational skills through the use of the senses by manipulating the materials designated in the exercises (AAAS, 1968). Maria Montessori also designed her didactic material to educate the senses and to develop observation skills of children (Montessori, 1964). The age range for Montessori and S-APA normally overlaps in the early childhood years of five through seven. This study focuses on the years of five through six, the year that would normally be considered as the kindergarten year.

The Problem

The purpose of this study was to compare preschool children from classes using the Montessori method and S-APA in the process skill of observation. To ensure that the two programs had common objectives to make a valid comparison (Kamii and Elliot, 1973), the first stage of the study compared the programs with respect to (1) the sequential presentation, (2) the use of materials to provide sensory training, (3) practice acquired through activities and (4) the role of the teacher.

The second part of the study was an investigation of the competence on observational tasks described in the learning hierarchy constructed for s-APA. This aspect of the study compared the competence on observational tasks of three groups of children. The first group received Montessori training for two years in preschool. The second group had used S-APA for one year with

a background of another type of preschool that excluded Montessori. The third group had neither Montessori nor S-APA training in their two year preschool experience. As a basis of comparison, each of the groups was given a set of observational tasks from the text, the Science Process Instrument.

Part One of the Study

(1) The sequential organization of S-APA is developed through a hierarchy of skills patterned on research that has been carried out by Gagnè and his associates (Gagnè, 1965). In S-APA, the process skills are arranged in a behavioral hierarchy to indicate gradated levels of sophistication. Montessori, also, developed a sequential approach. She analyzed motor movements that were congruent with her analysis of the child's cognitive development. From this knowledge, she designed didactic material to be used in a graduated sequence to provide an integrated structure for the child's learning experience (Montessori, 1964, 1965).

(2) Materials provide sensory training in S-APA. In this science program the child's success in attaining behaviors using the discrimination skills of the senses is dependent upon the manipulation of the material (AAAS, 1967). Montessori materials are designed to indicate errors allowing the child to make necessary corrections. According to Montessori (1965) these self-correcting materials promote successful independent learning and motivate him

to engage in more complex problem solving behaviors. These self-correcting materials provide the child with immediate information concerning the results of his responses. If the child makes a mistake, he will normally correct himself on the next trial instead of repeating the mistake.

(3) Practice acquired through activities is an essential element in both approaches. According to Gagné (1965), who helped develop S-APA, practice is a condition needed to attain the learning of the processes. This practice is provided in S-APA by a rich source of activities for each lesson. In Montessori, however, practice occurs in a different form in that the child repeats the activity without variation. This repetition facilitates the development of a high degree of proficiency in the various skills (Evans, 1971).

(4) The role of the teacher in S-APA and the Montessori method is to introduce the lesson as a problem solving activity. In S-APA the teacher sets the stage, but guides the child in the lesson. Whereas, in the Montessori method the teacher also sets the stage, but relies upon the self-teaching of the didactic material to accomplish the objectives of the lesson.

In S-APA there are eight lessons in the process of observation covered in the first year of the program. All of these are taught in the Montessori approach with the exception of Observing 5 involving color changes and Observing 6 involving solids and liquids.

Because S-APA and Montessori seemed to have common elements and because both programs seemed to have taught the process of observation there was a reasonable justification to compare student competence in the process of observation from the two programs.

Part Two of the Study

The subjects for this study were 75 preschool children, five to six years of age. Twenty-five of these children were enrolled in a Montessori school in Dallas, Texas, 25 were from a private kindergarten in San Antonio, Texas, where neither S-APA nor Montessori were used. This last group served as a control for the study to ascertain whether the achievement in the process of observation was a result of the instruction or was the result of some other factor.

Selection of the sample was controlled by the socio-economic level, the number of years in preschool, and the age level of the children. All of the children were from schools enrolling upper middle class children. The socio-economic status was verified by the school administrators on the basis of the parent's professions and the neighborhood in which they lived. Only students who had two or more years of preschool were used in the sample. This information concerning the amount of preschool for each subject was obtained from school records. All the children were five or six years old according to the

school records.

The Science Process Instrument (SPI) was used to determine the competence of students in the process of observation. This test was chosen on the basis of its organization and the behavioral tasks it measures. In this test, sixty-eight tasks assess the specific behaviors in the process of observation and are organized into the same sequence as the observation competence in the learning hierarchy developed for S-APA.

The SPI was individually administered to the subjects by the investigator in an effort to control the variable of different test administrators. To help eliminate unfamiliarity the test administrator played a group game with the classes involved in the study using questions similar to the task questions from the SPI. The testing time for each of the 75 children ranged from 10 to 40 minutes depending upon the task level the child achieved in the SPI. After the child had three incorrect responses, the testing was terminated.

Findings

The means from the competence level of each of the groups was compared by use of a t test at the .05 level of confidence. Table 1 indicates that there is no significant difference between the Montessori and the S-APA preschool students in regard to competence in observation tasks.

TABLE 1

COMPARISON OF MONTESSORI CHILDREN WITH S-APA CHILDREN IN OBSERVATION TASKS

Groups	Mean	D.F.	T-ratio	P	H_o
Montessori	26.52	49	.000	.9813	Not reject
S-APA	26.40				

Table 2 shows that there is a significant difference between the Montessori and the Non-Montessori/Non-S-APA preschool groups.

TABLE 2

COMPARISON OF MONTESSORI WITH NON- MONTESSORI/ NON-S-APA IN OBSERVATION TASKS

Groups	Mean	D.F.	T-ratio	P	H_o
Montessori	26.52	49	9.816	.0033	Reject
Non-Montessori non-S-APA	12.64				

In comparing the S-APA with Non-Montessori/Non-S-APA preschool children Table 3 shows that there is a significant difference between the two groups.

TABLE 3

COMPARISON OF S-APA WITH NON-MONTESSORI/
NON-S-APA IN OBSERVATION TASKS

Groups	Mean	D.F.	T-ratio	P	H_o
S-APA	26.40	49	8.838	0048	Reject

Results from these comparisons indicated that Montessori preschool children achieve as well as S-APA preschool children in competence on observational tasks. The data also gave evidence that the same skills in the process of observation were acquired by children using either the Montessori method or S-APA. A comparison of the means of the S-APA or Montessori group with the preschool group having neither S-APA nor Montessori (Table 2 and Table 3) seemed to indicate that children need to be taught the process of observation. This conclusion was supported in a study by Thier (1965) in which he found that observational skills need to be taught, that they are not acquired incidentally.

In analyzing specific data for the tasks of observation taught in the first year or Part A of S-APA the following was found. The tasks dealing with naming and identifying primary colors were the only tasks correctly completed by all the children from all the groups. Apparently this is a skill that is emphasized

in preschools and not unique to Montessori or S-APA. Although changes in color and substance are not part of the specified lessons from Montessori, the Montessori children did better than the S-APA children on these tasks.

The majority of the children completed ten tasks in all of the groups. Of the preschool children who had neither Montessori nor S-APA only one child was able to go beyond Task 27 to Task 62. His teacher remarked that his father was a science teacher.

Conclusions

Since observational skills provide directed learning experiences for sensory education, the process of observation could be incorporated into the early childhood curriculum. Organizing the preschool around intellectual skills and competencies from such processes as observatio, rather than subject matter topics (Hurd and Gallagher, 1968), could provide a basis for the curriculum of young children. Acquisition of observational skills may assist learning in other subject areas such as reading, mathematics, language arts, and social studies providing a basis for a substantial readiness program in these content areas. Competence in observational skills has a positive effect in the primary grades according to studies by Di Lorenzo and others (1969), and Ayers and Mason (1969).

The present study emphasized similarities in S-APA and the Montessori method in teaching the process skills of observation. Differences do exist in the two programs, however, and specific

techniques could be exchanged between S-APA and the Montessori method to emplement each program. For example, the S-APA teacher might rely on the materials to teach the lessons rather than directing the learning. According to Butts (1973), a writer of S-APA, using the program for independent learning experiences would not be in opposition to its basic philosophy.

Montessori teachers might also incorporate certain aspects of S-APA into their method of teaching. Since many of the Montessori lessons in observation are similar, the Montessori teacher might be able to use the clear behavioral objectives to establish a concrete method for evaluation. Montessori teachers can also use S-APA lessons as a basis for ideas for variation in activities.

Since Montessori equipment is very expensive, the teachers might include some of the material specified for S-APA which is more commond and more easily obtained. A Montessori preschool from a poverty district in Austin, Texas, has adapted this idea by developing a program using equipment suggested by S-APA for teaching the process skills with the Montessori method (Jackson, 1973).

The same study could be extended to relate achievement in observational competence to achievement in reading readiness. An investigation of this type would provide evidence for the implication made within the present study that the process of observation affects readiness in content areas.

BIBLIOGRAPHY

American Association for the Advancement of Science, Commission on Science Education. An evaluation model and its application: Second report. Washington, D.C.: AAAS, 1968.

American Association for the Advancement of Science, Commission on Science Education. Science-A Process Approach. New York Xerox Education Division, Parts A-C, 1967, Parts D-E, 1968.

American Association for the advancement of Science, Commission on Science Education. Science-A Process Approach: purposes: accomplishments: expectations. Miscellaneous Publication, 1967.

Ayers, Jerry, & Mason, George. Differential effects of Science-A Process Approach upon change in Metropolitan Readiness Test scores among kindergarten children. The Reading Teacher. 1969, 22, No.5, 435-439.

Butts, David. University of Texas, Austin, Texas. Interview. May 12, 1973.

Di Lorenzo, L. et Al. Pre-kindergarten programs for educationally disadvantaged children. New York State Education Department, 1969.

Evans, E.D. Contemporary influences in early childhood education. New York: Holt, Rinehart and Winston, 1971.

Cagné, Robert. Psychological issues in Science-A Process Approach. The psychological bases of Science-A Process Approach. Washington, D.C.: AAAS, 1965.

Hurd, Paul De Hart and Gallagher, James Joseph. New Directions in Elementary Science Teaching. Belmont, California: Wadsworth Publishing Co., 1968.

Jackson, Linda. Montopolis community school, Austin, Texas. Interview, August 21, 1973.

Kamii, Constance, & Elliot, David. Evaluation of evaluations. In Joe L. Frost (Ed.) Revisiting Early Childhood Education. New York: Holt, Rinehart and Winston, 1973.

Lillard, Paula Polk. Montessori--a Modern Approach. New York Schocken Books, 1972.

Montessori, Maria. The Montessori Method. New York: Schocken Books, 1964.

Shane, Harold. The renaissance of early childhood education. Phi Delta Kappan. 1969, 50, No. 7, 369, 412-413.

Thier, Herbert. A look at a first grader's understanding of matter. Journal of Research in Science Teaching. 1965, 3, No. 1, 84-89.